Mechatronic Systems

ELECTRONICALLY CONTROLLED

Öhlins Mechatronics Shock Absorber Kit

TTX EC

Owner's Manual

ÖHLINS
ADVANCED SUSPENSION TECHNOLOGY

Introduction

Öhlins Racing AB - The Story

It was the 1970's, a young man named Kenth Öhlin spent most of his spare time pursuing his favourite sport: motocross.

A careful observer, Kenth's attention was continually drawn to one specific detail - motocross bikes had more engine power than their suspension could handle.
It was not long before Kenth realised that better performance could be achieved by improved wheel suspension.

Öhlins Racing was established in 1976, and just two years later the company won its first World Championship title. Despite being in the business for 30 years, the search for perfection and new functions is still the main focus of the company.

Congratulations! You are now the owner of an Öhlins Shock Absorber. More than two hundred World Championships and other major world titles are definitive proof that Öhlins shock absorbers offer outstanding performance and reliability.

Every product has gone through rigorous testing and engineers have spent thousands of hours, doing their very best to use every possible experience from our 30 years within the racing sport.

The product that you now have in your possession is pure racing breed that is built to withstand.

By installing this shock absorber on your bike you have made a clear statement… you are a serious rider with a focus on getting the maximal handling ability and outstanding feedback from your bike. Along comes the fact that your shock absorber will be a long lasting friend, delivering the very best of comfort and performance every time you go for a ride.

Go explore!

General Warnings

Note!
The shock absorber/front fork/steering damper is an important part of the vehicle and will affect the stability.

Note!
Read and ensure you understand the information in this manual and other technical documents provided by Öhlins, before using the product.

Note!
Öhlins Racing AB can not be held responsible for any damage to the shock absorber/front fork/ steering damper, vehicle, other property or injury to persons, if the instructions for mounting, usage and maintenance are not followed exactly.

⚠ Warning!
After installing the Öhlins product, take a test ride at low speed to ensure your vehicle has maintained stability.

⚠ Warning!
If the suspension makes an abnormal noise, or the function is irregular, or if you notice any leakage from the product, stop the vehicle immediately and return the product to an Öhlins Service Centre.

Note!
The product warranty shall only apply if the product has been operated and maintained in accordance with recommendations in this manual. If you have any questions regarding usage, service, inspection and/or maintenance please contact Öhlins.

Note!
When working with the Öhlins product, always read the Vehicle Service Manual.

Note!
This Manual shall be considered a part of the product and shall therefore accompany the product throughout its life cycle.

SAFETY SYMBOLS

In this manual, mounting instructions and other technical documents, important information concerning safety is distinguished by the following symbols:

⚠
The Safety Alert Symbol means: Warning! Your safety is involved.

⚠ Warning!
The Warning Symbol means: Failure to follow warning instructions can result in severe or fatal injury to anyone working with, inspecting or using the shock absorber, or to bystanders.

Caution!
The Caution Symbol means: Special precautions must be taken to avoid damage to the shock absorber.

Note!
The Note Symbol indicates information that is important regarding procedures.

Product Specific Warnings

⚠ Warning!
This product was developed and designed exclusively for a specific vehicle model and shall only be installed on the intended vehicle model in its original condition as delivered from the vehicle manufacturer.

⚠ Warning!
This product contains pressurized nitrogen gas (N_2). Do not open, service or modify this product without proper education (authorized Öhlins dealer/distributor) and proper tools.

Caution!
This product is to be connected to the electrical system of the vehicle. Make sure that the battery is disconnected before doing any connections. If you have any doubts or questions, contact authorized Öhlins dealer/distributor.

© Öhlins Racing AB. All rights reserved. Any reprinting or unauthorized use without the written permission of Öhlins Racing AB is prohibited.

Contents

In this Manual

Introduction	1
Safety Precautions	2
Contents	3
Design and Function	4
Compression and Rebound	7
Spring Preload	8
Adjustment and Setup	8
Inspection and Maintenance	10

Design and Function

Congratulations on choosing the Öhlins TTX Road & Track shock absorber - the most unique and powerful racing shock absorber available today. The TTX shock absorber design is the culmination of two decades of Öhlins successful participation in World Championship events.

This shock absorber draws on all the expertise developed by Öhlins while winning more than one hundred World Championship titles.
The Öhlins TTX features a patented concept with a unique concentric twin tube design, together with a solid main piston, that allows for the gas pressure to always back-up the low-pressure side of the main piston. This design creates positive pressure build up on both compression and rebound stroke. As a result the TTX has a more direct damping response, less risk for cavitation and works with lower gas pressure.
Compared to a regular piggy back single tube shock absorber, that has positive pressure build up only on rebound stroke and relies on compression valve resistance together with gas pressure to avoid cavitation on compression stroke, the TTX design is superior.
Also the twin tube design with separate channels connecting the compression valve to the compression side of the main piston and the rebound valve to the rebound side of the main piston, gives the possibility to have completely separated adjusters for compression and rebound damping.
The whole system is pressurized by nitrogen gas behind a floating piston to ensure separation of the gas and fluid. A top out spring is fitted in the TTX for optimum performance during hard braking.
On the mechatronic version of the TTX system, all adjustments is done by the Öhlins ECU. This electronically controlled (EC) system incorporates smart functions such as preprogrammed riding modes with different damping characteristics in relation to speed and riding behavior.

Support is always available from the Öhlins distributors worldwide.

Design and Function

TTX EC Concept

The possibility to adjust damping settings during travel have been some what of a dream. Now Öhlins Racing have solved the problem with the TTX EC concept, also called Mechatronics. Well tested algorithms controls the damper settings depending on, for instance, the speed. A micro-controller together with stepper motors can change damper settings during your drive. You can say that you have a remote control that controls the rebound and compression settings on a shock absorber or front fork, or both.

EC Software

The EC software from Öhlins provides different driving modes for the driver.
Depending on the bike, Öhlins delivers different settings that suites the expected riding style for that bike. For more information on riding modes for your bike, please look in the Mounting Instruction.

Electronic Control Unit (ECU)

Öhlins suspension ECU is a compact electronic control unit designed for embedded real time suspension control applications. It controls several stepper motors and one DC motor with position feedback.

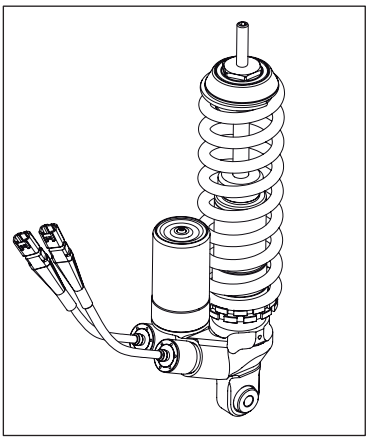
Design and Function

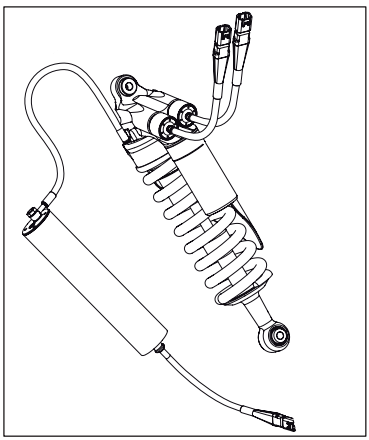
TTX EC Shock Absorbers

The TTX is ideal to equip with EC adjusters due to its twin tube design and always having positive damping pressure build up. In other words, the pressure is always raised to create damping, independently of how the bleed is adjusted. Nitrogen pressure can then be low, which gives low friction. The adjustment range can be very wide for both compression and rebound damping.

Preload Adjuster EC (not on all models)

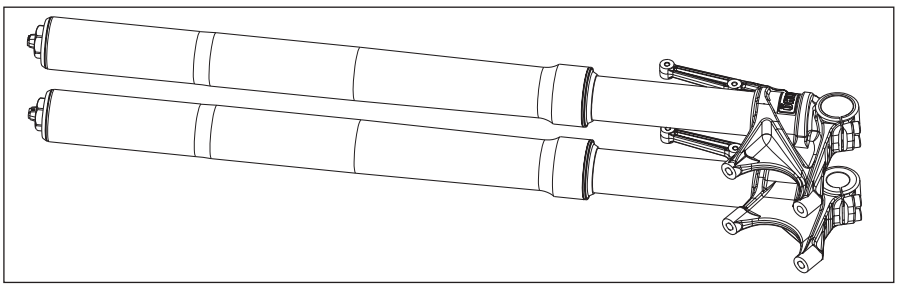
The preload adjuster EC is a light and tiny unit that offers superior performance versus size ratio. It is a traditional remote hydraulic preload adjuster but with a DC motor adjusting the spring preload controlled by the Öhlins ECU, instead of a manual operated one. The system also provides information of the preload position to get optimal set-up for different conditions and circumstances, for example having a passenger and/or luggage.
When having an electronically controlled shock absorber such as the TTX EC, the compression and rebound adjusters are set by the electronical control unit.





Front Fork EC System

In an EC-adjusted front fork the adjustment needle is activated by an electrical stepper motor. The control of the EC-motors can be adjusted with either a separate panel or embedded in the vehicles own ECU.



Compression and Rebound

When having an electronically controlled shock absorber such as the TTX EC, both compression and rebound are controlled by the ECU.

When adjusting the spring preload you move the spring seat. This will decrease or increase the initial spring force, which will lower or raise the motorcycle rear ride height.

The spring preload is fundamental for the function of the suspension. If the preload is incorrectly set, any other adjustments will not help to get the intended performance from the suspension.

How to Set the Spring Preload

1. See the information in the appropriate Mounting Instruction concerning your vehicle.

Adjustment and Setup

⚠ Warning!

Before riding, always ensure that the basic settings made by Öhlins are intact. Take notes, adjust in small steps and make only one adjustment at a time.

Step 1

Spring Preload - Free Sag - Ride Height

Spring preload is a crucial part of setting your motorcycle since it affects the height of the motorcycle and the fork angle.

👁 Note!

The following procedure should be performed on a flat surface.

1. Put the motorcycle on a workstand so that both wheels are off the ground and the suspension is unloaded.
2. Mark, for example with a piece of tape, a point immediately above the rear wheel axle.
3. Measure the distance from the marked point to a fixed point, for example the wheel axle (R1).
4. Measure the distance from the bottom of the upper triple clamp to a fixed point, for example the front wheel axle (F1).
5. Put the motorcycle on the ground so that the front and the rear suspensions are slightly compressed. Repeat the measuring procedures (R2 and F2).
6. Sit on the motorcycle in normal riding position, properly outfitted in your riding gear. Repeat the measuring procedure (R3 and F3).

Recommended Measures

If no other recommendations are given in the Mounting Instructions follow the measures below:

Free sag (R1-R2), (F1-F2)

Rear	5-15 mm
Front	20-30 mm

Ride height (R1-R3), (F1-F3)

Rear	25-35 mm
Front	30-40 mm

👁 Note!

Always check on the Öhlins web site **www.ohlins.com** *or with your Öhlins dealer/ distributor for the latest information*

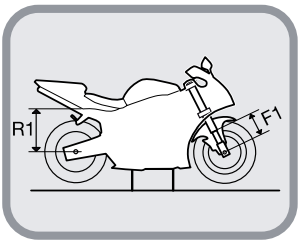
Step 2

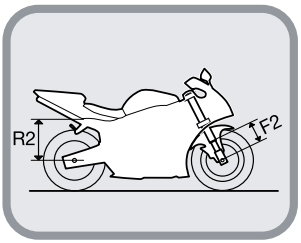
Adjust spring preload

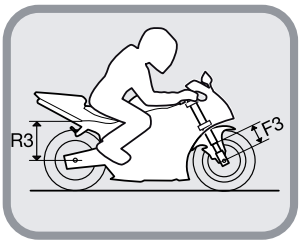
1. If your measures differ significantly from the recommendations in the Mounting Instructions or the table above, adjust the spring preload. (See section Spring Preload in this manual).
2. If the ride height still differs from the recommendations, you may need to change to softer/harder spring. Contact your Öhlins dealer for advice.

⚠ Warning!

Incorrect spring rate may result in a front geometry that is either too steep or too flat. This can result in a tendency of under or over steering, that could seriously affect the handling characteristics of the motorcycle.







Stability and Traction

All motorcycles are designed with a suspension geometry that includes height and fork angle. The changing of components can affect this and it is therefore essential that both the front and the rear ends match each other. Changing to Öhlins suspension gives optimum performance only when both the front fork and the rear suspension interact properly. It is very important that the front and the rear loaded heights are within the specified values.

Front Fork Springs

To optimize the stability and traction of your motorcycle the front fork must match the rear suspension. Öhlins Racing has a variety of front fork springs available for a large number of motorcycle models.

The springs in combination with the Öhlins shock absorbers contribute to superior stability and traction. See the Öhlins Recommendation List by contacting your nearest Öhlins dealer or using our web site.

⚠ Warning!

If there are no matching springs for your motorcycle model, use the original springs, however, they must be in good condition and not fatigued.

FGK kits and Piston kits

Öhlins Racing also produces complete Racing Cartridge Systems, for front forks, as well as piston kits to upgrade your front fork to a higher performance level.

Prepare the Settings

By adjusting the shock absorber and testing by trial and error you can learn how the different settings affect your motorcycle.

Always begin your setting by taking a test ride with all adjustments at their recommended basic setting. Choose a short run of varying character, for example with long as well as sharp bends, hard as well as soft bumps. Stay on the same run and adjust only one setting at a time.

Preventive maintenance and regular inspection reduces the risk of functional disturbance. If there is any need for additional service, please contact an authorized Öhlins workshop.

Cleaning

Clean the shock absorber externally with a soft detergent. Use compressed air. Be careful that all dirt is removed. Lift the bump rubber and clean the area below. Keep the shock absorber clean and spray it with oil (WD40, CRC 5-56 or equivalent) after washing. Wipe off excessive oil with a cloth.

Caution!

Never spray water directly into the adjuster knobs and/or the ball joints.

Inspection

1. Check ball joints for possible excessive play or stiction.
2. Check the piston shaft for leakage and damage.
3. Check the shock absorber body for external damage.
4. Check the reservoir for external damage that can restrict the floating piston from moving freely.
5. Check for excessive wear of rubber components.
6. Check the attachment points of the shock absorber to the vehicle.
7. Check the electrical wires and connectors for external wear or damages.

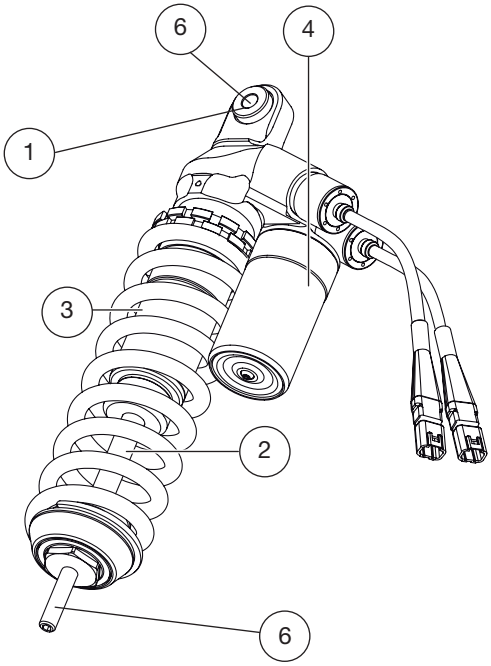
Recommended Service Intervals

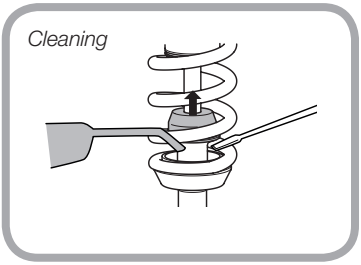
Racing: Every 10 hours of operation.
Maximum 20 hours of operation without service and oil change.

Regular street use: Every 30 000 km

Disposal

Discarded Öhlins products should be handed over to an authorized Öhlins workshop or distributor for proper disposal.



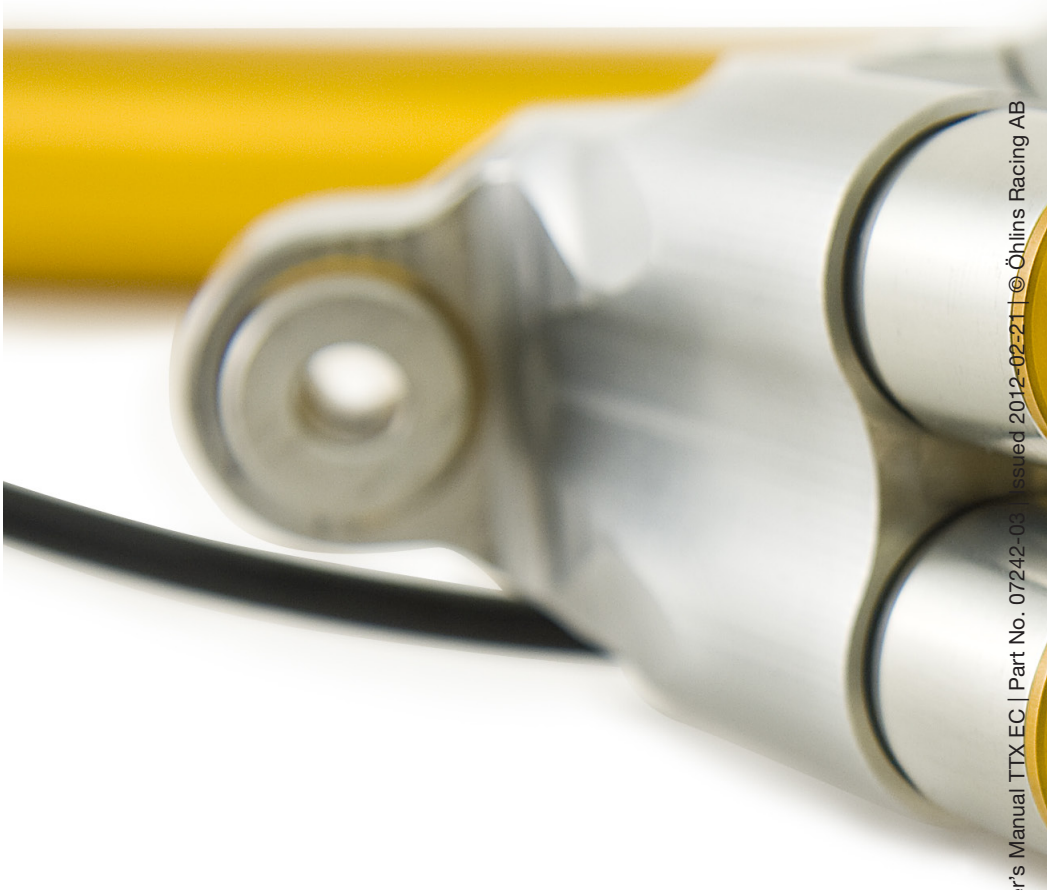


Note!

The Öhlins shock absorber should only be filled with Öhlins High Performance Shock Absorber Fluid. Contact an Öhlins dealer for advise.

Warning!

Never alter the gas pressure. Special purpose charging equipment and access to nitrogen is required.



Öhlins Owner's Manual TTX EC | Part No. 07242-03 | Issued 2012-02-21 | © Öhlins Racing AB

Your Öhlins retailer:

Öhlins Racing AB
Box 722
SE-194 27, Upplands Väsby
Sweden

Phone: +46 (0)8 590 025 00
Fax: +46 (0)8 590 025 80
www.ohlins.com

ADVANCED SUSPENSION TECHNOLOGY

www.ohlins.com